

Western Engineering Outreach

Chalk It Up

Grade K-2

Meet Today's ENG HERO!



Mita Ray - Professor with Western Engineering

Mita Ray is a professor with the Chemical Engineering Department at Western University. She has a Masters in Chemical Engineering and a PhD in Environmental Engineering. She does work with water (which is a liquid!). Her research focuses on water and waste water treatment and her goal is to reduce pollution in the environment. To learn more about Dr. Ray visit:

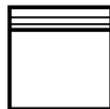
https://www.eng.uwo.ca/chemical/faculty/ray_m/index.html

Learning Goal:

- Students will expand their math skills and fine motor skills by measuring and mixing ingredients.
- Students will discuss states of matter to learn about solids, liquids, and gases.
- Curriculum Connections: Grade 1 - Materials, Objects, and Everyday Structures; Grade 2 - Measurement, Properties of Liquids and Solids

Materials Needed:

- Cardboard
- Tape
- Scissors
- Measuring cups: $\frac{1}{2}$ cup, $\frac{1}{4}$ cup
- $\frac{1}{2}$ cup of water
- Washable paint (any colour will do!)
- Large Ziploc bag
- $\frac{3}{4}$ cups plaster of Paris (available at Walmart, Canadian Tire, Home Depot, Michael's, or online



[https://www.amazon.ca/Plaster-Paris-Wall-Patch-](https://www.amazon.ca/Plaster-Paris-Wall-Patch-Compound/dp/B081TGOZDF/ref=sr_1_23?keywords=plaster+of+paris&qid=1585855542&sr=8-23)

[Compound/dp/B081TGOZDF/ref=sr_1_23?keywords=plaster+of+paris&qid=1585855542&sr=8-23\)](https://www.amazon.ca/Plaster-Paris-Wall-Patch-Compound/dp/B081TGOZDF/ref=sr_1_23?keywords=plaster+of+paris&qid=1585855542&sr=8-23)

Engineering and Science Connections:

Today, we will learn about the states of matter. Matter makes up everything in the world and it comes in three different states: solid, liquid, and gas.

Solids

Imagine being in a crowded room where nobody can move. Solids are made up of particles like this—they're so tightly packed together that they can't move about freely. Since they're stuck in place, their shape usually stays the same. The easiest way to identify a solid is by checking to see if it's hard and has its own shape.

Name some things that are solid!

Solids include things like TVs and ice. Don't be confused by things like sand and clay, which may not look like solids but actually are. Sand is just made up of very small pieces of solids, and when clay is left alone, it remains in its shape until molded.

Liquids

Now imagine that there were fewer people in that room and people could walk around comfortably. Liquids have particles that can move around in a similar way. Unlike solids, liquids don't have a shape of their own because the particles move around more. Instead, liquids take on the shape of the cups, jars, bowls, or other containers they're in.

Name some things that are liquid!

Liquids include many things we love, like soda, hot cocoa, and drinking water.

Gases

Now imagine we only have a few people in the room, and there is lots of room for them to move about. Gases have particles that move around in a similar way. Like liquids, gases can take the shape of their container because the particles have lots of room to move around. Sometimes you can't see gas, but it is still there.

Name some things that are gas!

Gases include things like the air we breathe, smoke from a fire or a candle, and the steam over a pot of boiling water.

Video Recommendation: The States of Matter

<https://www.youtube.com/watch?v=JQ4WduVp9k4>

Activity:

Before beginning, think about the following questions:

- What are the three states of matter?
- What are examples of each?
- Can a liquid change state? What are some examples?
- What state of matter is the water? The paint? The plaster of Paris?
- What state of matter will they be when we mix them all together? What about after time has passed?

States of Matter Game

Everything (matter) is made up of tiny, tiny particles called *atoms*

In our different states of matter, our atoms can be super close together, or more spread out

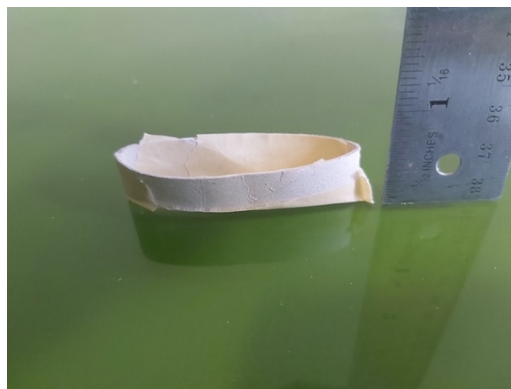
In the atom game, have your student(s) roam around the room. Call out a state of matter.

- Solid: the student should pack themselves close together with other people in the room, or other objects.
- Liquid: the student should be somewhat spread out, but still fairly close together with other people or things
- Gas: the student should spread out as much as possible

Play a few rounds. Head outside to play if you need some outside time!

Part 1: Building a Mould

- First we must build a small mould that we will pour the chalk mixture into. They can be as big or as small as the student would like their chalk to be. Make as many moulds as you want. The more you make, the more sticks of chalk you will have.
- Use cardboard to make the moulds. If the cardboard you are using is a toilet paper/paper towel roll, you can cut it into small slices and tape up the bottom.
- Cover the inside of your mould in tape so that the chalk mix does not leak out.
- Your mould may look like this:



Part 2: Mixing the Chalk

- Have students measure and add $\frac{3}{4}$ cup of plaster of Paris in a large ziploc bag
- Measure and add $\frac{1}{2}$ cup of water and a generous amount of paint
- Seal the ziploc bag well and minimize the amount of air in the bag
- Have students use their hands and squish the bag until everything is mixed
- If the mixture seems too runny, add a bit more plaster of Paris
- Add more paint as desired to make the colour stronger.
- When the mixture looks well-mixed, cut off one corner of the bag and put it in the mould.
- Repeat for different colours of paint.
- Allow the chalk to dry for 1-2 hours.
- Take your chalk outside and test it!

What Did You Learn?



- What are the three states of matter?
- What state of matter is the chalk?
- What state of matter was the chalk when we left it to dry? Liquid. Over time the water dried and we were left with a solid piece of chalk.

Future Learning



- Turn this chalk activity into an experiment! In order to do this, try three different chalk recipes. Use less water in the first recipe, the same amount of water in the second recipe, and more water in the third recipe. Make a prediction: what will happen to each recipe because we have changed the amount of water? Make chalk with each recipe and compare the end results. Did the amount of water make a difference? Which recipe did you like the best and why?

Share your creations!

We would love to see what you made. Email as at discover@uwo.ca or tag us on social media.

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Facebook: @westernueng

Thanks for discovering with us!